

I hope Doctor Tobias' paper will stimulate others to assist in blazing new trails into this more or less unexplored field, and that they may be persuaded to report their results and progress from year to year.



GEORGE M. STEVENS, M.D. (Epidemiologist, Los Angeles City Health Department, Los Angeles).—The subject discussed by Doctor Tobias is of vital importance in the management of the acute infectious diseases. The principles cited need not necessarily be confined to pediatrics, but readily lend themselves to similar conditions in the adolescent and older age groups.

The author's theoretical aspect of this subject has a sound physiological basis. He has succinctly summarized his principles of successful management by stating that "the nutrition for the toxic patient must provide an ample phospholipid and nucleoprotein intake." During my many years of service at the Communicable Disease Unit of the Los Angeles County Hospital it has been my privilege to have witnessed these principles applied to practical use. The results have been most gratifying. The principles of dietetics are often confusing. Frequently we continue with our regimen of therapeutic and dietetic management solely on the basis of precedent, and not on sound physiological knowledge. I have observed many patients who had received adequate specific medication but who clinically continued to regress. This, despite the fact that their diets were presumed to be adequate. Subsequently, the principles advocated by Doctor Tobias were instituted and, much to my surprise and pleasure, I noted many a dramatic and rapid convalescence, which terminated in complete clinical recovery.

I cannot overemphasize the correlation as to the value of good nutrition based on the principles of modern-day physiology and medication. These factors are essential for the satisfactory immunological response of the patient to the toxemias of the acute infections. The two are closely interwoven and are of equal importance. The principles evaluated in this article are readily applicable to our every-day practice with the most encouraging clinical results.

MAXILLARY SINUS IRRIGATION THROUGH THE OSTIA*

WITH ANATOMICAL AND CLINICAL DEMONSTRATIONS

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DISCUSSION by Jay Randolph Sharpsteen, M.D., Oakland; Rea E. Ashley, M.D., San Francisco; Ben L. Bryant, M.D., Los Angeles.

NATHANIEL HIGHMORE,¹ in 1651, described a suppurative disease of the nasal accessory sinus which bears his name. Since Highmore there have been innumerable treatises upon the anatomy and pathology of the maxillary sinus. Today the fundamentals of diagnosis and treatment are based upon a consideration of the work of these past teachers.

Irrigation of the maxillary sinus has long been an established procedure in diagnosis and treatment. Five methods of irrigation are recognized: (1) Cowper's² method; (2) approach by way of the canine fossa; (3) puncture of the middle meatus; (4) puncture of the inferior meatus; (5) cannulization of the ostia of the middle meatus. These methods are all familiar to rhinologists. This discussion, however, will be limited to irri-

gation by way of the ostia of the maxillary sinus. While this method is now widely used, some rhinologists may not have experienced the advantages of this approach without puncture.

HISTORY

Jourdain,³ a dentist of Bordeaux in 1765, is said to have been the first to use the approach to the maxillary sinus through the middle meatus. The shape of the instrument used by Jourdain indicates strongly that the membrane of the middle meatus was punctured. Although the patient was relieved by this procedure, Jourdain³ and his method were condemned as dangerous and unsafe by the French Council of Medicine. Stoerk,⁴ as early as 1886, preferred the ostium technique to the then newly introduced puncture through the inferior meatus. Hartmann⁵ also endorsed this method, and was able to irrigate twenty-three out of thirty-two maxillary sinuses with this approach.

LITERATURE

The literature of more recent years shows a wide variance of opinion by rhinologists of wide clinical experience. Favoring this approach, Meyerson⁶ stated: "It would appear from this study that irrigation of the maxillary sinus through its ostium is a feasible procedure, in a sufficiently large percentage of cases, to make it worthy of a trial." Dintenfass,⁷ likewise, states that "in the diagnosis of disease of the maxillary antrum, ostial catheterization should always be attempted before resorting to the puncture of the inferior meatus."

On the contrary, Ross Skillern⁸ does not think that this method is practical, and Mosher,⁹ in 1929, said: "It is difficult, if not impossible, in the majority of cases to catheterize the ostium of the antrum. From the surgical standpoint, however, this makes but little difference, because it is easy to break into the antrum near the ostium through the membranous area in which the ostium is placed." Also supporting the negative view, Sieur and Jacob¹⁰ stated that "since the ostium opens into the lowermost portion of the infundibulum, one must agree with Zuckerkandl that 'it is entirely superfluous to tire oneself in sounding it.'" The use of the ostia for cannulization of the maxillary sinus must have some value to have merited so much consideration. The fact that the views are controversial should stimulate to further study of this problem.

ANATOMY

A review of the anatomy of the middle meatus will clarify the possibilities of approach through the natural or accessory ostia. Under the middle turbinate, anteriorly and below, there is the uncinat process, which forms the anterior inferior lip of the hiatus semilunaris. The superior posterior lip of the hiatus is formed by the bulla ethmoidalis. The divergence of these two structures, the bulla ethmoidalis and the hiatus semilunaris, is the bullo-uncinate angle. The infundibulum is the groove bounded by the hiatus semilunaris, bulla ethmoidalis and the bullo-uncinate angle posteriorly.

In this series of twenty dissections, accessory ostia were found in approximately 30 per cent.

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The most usual location of these accessory ostia was the bullo-uncinate angle. Variability in size was observed to range from 6 by 4 millimeters to 1 by 1½ millimeters. Double accessory ostia were found in three specimens. The natural ostium, unlike the accessory ostia, was found to be a canal.

Van Alyea¹¹ has recently made an anatomical study of the accessibility of the ostium. In his specimens, these studies showed an accessibility of the ostia of 54.6 per cent. M. C. Meyerson,¹² in a similar series, stated that only fifteen of one hundred and fourteen (approximately 13 per cent) of his studies were inaccessible. This is a much higher percentage of accessibility than was found in my dissections, as follows: The natural ostium, in the fixed specimen, was found to be accessible in only 40 per cent of the dissections without forcing or tearing the fixed tissues. Accessory ostia made accessible an additional 30 per cent—a total accessibility of 70 per cent. This 40 per cent accessibility of the natural ostium in these dissections does not compare favorably with the accessibility stated by Meyerson.¹³ The total accessibility, however, by way of the middle meatus, did approach this percentage more closely.

CLINICAL EXPERIENCE

Clinically, Lee Hurd¹⁴ states that he has sounded the natural ostium in practically 70 per cent of his patients. Undoubtedly, a reasonable percentage of this cannulization was done through the accessory ostia. Schaeffer¹⁵ made further clinical observations and stated that "clinically, in a vast majority of cases it is impossible to sound a maxillary sinus through its ostium." My clinical experience, embracing some 1,200 cases over a period of the past four years, does not support such a statement. In my experience, it has been possible to irrigate the maxillary sinus through the middle meatus, without puncture, in 72 per cent. By observing the position of the cannula, it is my conclusion that approximately one-third of these cases were irrigated by way of an accessory ostium. These clinical observations coincide closely with the anatomical facts of accessibility in my dissections. Meyerson¹⁶ stated, clinically, a high accessibility of 81 per cent, which is far beyond my conclusions of accessibility by way of the natural ostium alone.

INDICATIONS

The indications for irrigation of the maxillary sinus, by way of the natural or accessory ostia, are the same indications as for other methods. This technique should never be forced, and in those cases where it is used with ease the experience is gratifying to the patient, particularly when a puncture has previously been experienced.

ADVANTAGES

The advantages of irrigation without puncture can be summarized as follows: (1) Danger of air embolism is reduced. (2) Hemorrhage is not experienced. (3) The unpleasantness of pressure is greatly eliminated. (4) Infiltration, or emphysema of soft parts, is less liable with a dull instrument. (5) Nervous patients experience less shock than

when a sharp needle is forced through bone, or even membrane. (6) Where the ostium is inaccessible, anesthesia is complete for puncture through the middle meatus. (7) Shrinking the tissues of the middle meatus, even when puncture has to be performed, has the benefit of an improved aeration and drainage of the sinuses emptying into the middle meatus. (8) A patient who has experienced irrigation through the natural opening will not permit puncture.

LIMITATIONS

There are certain limitations to the approach of the maxillary sinus through the natural ostia. Most of these limitations are due to anatomical or pathological inaccessibility, such as: Anatomical—(1) Middle turbinate hypertrophied; (2) deviated septum filling the middle meatus; (3) a high uncinate process; (4) an overhanging bulla ethmoidalis; (5) an exceptionally deep infundibulum; (6) a natural ostium less than 1½ millimeters in diameter (which precludes proper exit for maxillary content). Pathological—(1) Middle meatus filled with polyps; (2) acute or chronic inflammation of ostia, resulting in contracture or closure (which usually yields to shrinking) (3) closure due to irritation of repeated cannulizations (which occurs in small ostia of marginal accessibility).

CONTRAINDICATIONS

The chief contraindication for irrigation through the natural ostium is where an ostium is found with difficulty by the operator for any reason. The prolonged manipulation of the tissues of the middle meatus cause inflammation and swelling of the tissues in that region, which swelling may block the ostia of the other sinuses emptying into this area. Some judgment must be exercised in using this method, or the benefits will be more than neutralized.

INSTRUMENTS

The number of instruments which have been devised for irrigation through the middle meatus without puncture gives further proof of the interest rhinology has long shown in this problem. The first instrument of Jourdain was a clumsy cannula, not suited by size or curve. The number of instruments collected by M. C. Meyerson¹⁷ show a progressive refinement, and reflect further anatomical adaptation. The cannula first made by Pierce has become the model upon which most instruments used for this work are based. Early in my efforts in this field, it was observed that the choice of instruments was very limited, particularly in size and flexibility. This technique demands a wide choice of size, flexibility, and a variable angle of the tip is essential. The natural ostium, which is actually a canal, as demonstrated by myself, and even more extensively by others, may be either vertical, horizontal, or oblique in position. The silver cannula, fitted to a steel shank with a thumb rest, and made up in sizes from 1½ to 2½ millimeters, has been found in my work to be well adapted to this technique. The thumb rest has assisted in applying gentle pressure and in guiding the tip into the ostium.

TECHNIQUE

An exact knowledge of the anatomy and its variations in the region of the ostium is essential to successful passage of the cannula without trauma. Experience and observation of the nasal anatomy in each case dictates the choice of instrument. A hypertrophied middle turbinate, a deviated septum, a deep middle meatus or infundibulum, or both, and other factors as have been mentioned, must be considered. The length of the curved silver tip should be shortened in children and small noses. It is not unusual to pass a medium or even large cannula with ease in a child. This experience with children confirms that of Yankhauer and Goldman,¹⁸ who were able to cannulize infants in the first year of life. A good anesthesia must be secured well anteriorly in the middle meatus and superiorly over the edge of the uncinate process into the infundibulum.

The cannula is used in the left hand for the left side, and in the right hand for the opposite side. The use of either hand may seem a bit awkward to the occasional operator, but the advantage of persistence in this effort will soon be appreciated. The instrument is first passed along the floor of the nose, tip upward, pointing into the middle meatus well posteriorly. It is then moved gently forward and laterally until it is felt to drop into the infundibulum, and not unusually into an accessory ostium. Manipulating the cannula further forward into the bulbo-uncinate angle, the tip may be felt to engage the natural ostium, and with only gentle pressure the tip should fall into the antrum if accessible by this route. It must here be remembered that the ostium is actually a canal, and may be vertical, horizontal, or oblique. The patient should experience no pain and little pressure.

COMPLICATIONS

There have been no complications where the technique as outlined has been observed. In two cases over a period of four years, and during the first two years of my experience, too much pressure was applied and the blunt tip was passed through the naso-orbital angle of a narrow antrum into the orbit. In one of these cases there was some emphysema of the soft tissues of the orbit, and the other case showed a slight infiltration of these tissues. No pain was experienced in either case, only a sense of fullness in the region of the eye. Fortunately there was no resultant infection. Intra-antral hemorrhage was experienced in one case. Great pain was experienced by this patient for two days following the irrigation.

Resistance to pressure was noted in another case after the tip had entered the ostium with ease. This patient experienced much discomfort for thirty-six hours, when there was a sudden gush of yellow pus from the nose, with immediate relief. There was probably a purulent cyst punctured with even the dull tip, or the pressure in the antrum was so increased around the cyst, which blocked the exit of the fluid that the pressure caused it to rupture. Acutely inflamed sinuses are not irrigated unless the pressure symptoms definitely indicate such procedure.

CONCLUSION

During the first year only selected cases were attempted. The last three years, all cases which did not show distinct contraindications as mentioned, have been attempted through the ostia where irrigation was indicated. Irrigation by this method has been successful, as stated, in 72 per cent of these cases. Many cases showed profuse, granular and floccular pus in the return fluid, and cleared up with no further treatment than irrigation by this method. Where there was a persistence of purulent return without improvement in quality, or a mucoid tendency of the discharge, antrotomy or further surgery was recommended, according to indications.

Irrigation of the maxillary sinus by way of the ostia, when accomplished without extensive manipulation, is a valuable procedure, and has a distinct advantage over other methods of sinus irrigation.

SUMMARY

Irrigation of the maxillary sinus through the ostia is not a new procedure. Regardless of this fact, there is a difference of opinion by authorities as to its value, which should stimulate further investigation.

A consideration of the anatomical work presented shows a total accessibility of 70 per cent by way of the ostia; accessibility of the natural ostium, 40 per cent; accessibility of the accessory ostia, 30 per cent.

Approximately 1200 cases have been cannulized, without puncture, by way of the middle meatus in the past four years. Clinically, 72 per cent of the irrigations have been accomplished by this technique.

There are advantages of irrigation by means of the ostia which make it a valuable procedure in cases to which it is suited. There are certain anatomical and pathological conditions which contraindicate the use of this technique.

The choice of instrument and a certain skill, acquired with practice, are essential to accomplishment without excessive manipulation. The use of either hand must be developed for skillful cannulization.

Complications are unusual and less serious than those seen after puncture.

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DISCUSSION

JAY RANDOLPH SHARSTEEN, M.D. (3115 Webster Street, Oakland).—We, all of us, welcome a method whereby the maxillary sinuses may be irrigated with the least possible trauma or discomfort to the poor miserable individual who presents himself with an acutely congested nasal mucous membrane and an antrum overloaded with pus.

As Doctor Futch has pointed out, the shrinkage of the middle meatus, coincident with its anesthetizing, provokes and facilitates drainage not attainable otherwise.

That Doctor Futch is successful in applying this method in 72 per cent of his attempts would seem to indicate that the native of Iowa and his Southern California descendants have much more roomy meati than narrow-nosed, gray-bound individuals so common in the more northerly portions of this great and glorious State.

I have not accurately checked my own records in this regard, but should unhesitatingly state that were I able to introduce a cannula in as many as 40 per cent of the patients, my problems would be much less difficult.

It always seems my especial misfortune to find that the patient upon whom I would particularly want to use this procedure has a host of bad nasal anatomy, which simply means two strikes called on me before I have a chance to swing at the ball.

It might very well be that, had I an assortment of middle-meatus cannulae such as the author possesses, my batting average would thereby be increased, but I merely have one size of the Yankhauer instrument.

My experience has been that when this procedure is possible, it is perfect; but I have had to resort, all too frequently, to a puncture of the lower meatus.

An important and very satisfactory use of this procedure, and one which was not mentioned, is for the purpose of filling the sinuses with radio-opaque solutions for x-ray examination. It is in this connection that I find it most valuable.

The other advantages of this method have been enumerated by the author. The disadvantages which have been my lot to observe are: (1) It is time-consuming; (2) It frequently produces more trauma in the middle meatus than is justifiable because, after all, this is the region through which drainage occurs, and the swelling, which all too frequently follows the manipulation of these already insulted tissues, often counteracts the advantages.

Both methods have been used upon me, and I cannot say that I have much choice; but I can say that I recovered more quickly and with less discomfort by puncture of the inferior meatus.

REA E. ASHLEY, M.D. (384 Post Street, San Francisco). Doctor Futch's review of the subject, and his high percentage of success will undoubtedly stimulate others in an effort to obtain equally good results. After trying a method several times and failing, we are apt to condemn it, or at least discard it as a routine procedure. The paper will, I am sure, serve as a reminder to those of us who use another technique routinely, that the normal ostium method is possible in many cases.

In our office we prefer to wash the antrum by actual puncture under the inferior turbinate. We have tried both methods, and, while our experience in the normal opening technique has not been as great as that of Doctor Futch, we believe that, in our hands at least, puncture through the lateral wall has certain advantages. Some of the more important ones are: (1) the puncture method is applicable to a far greater number of cases; (2) the danger is slight; (3) with the puncture method we are sure that we have actually washed the antrum and not just washed in the general locality of the ostium; (4) the ostium is frequently so small that the cannula may almost completely close it, thus preventing free return of the solution. Solution forced into the antrum by the needle method has the advantage of the entire ostium as an exit.

We do attempt, however, the irrigation through the normal ostium in certain selected cases, *i. e.*, in those patients with heavy lateral walls where needle puncture is difficult, and also where patients have acute antra and irrigation is indicated.

Yet I must admit that the percentage of times we have been able to catheterize the normal ostium is far below the experience of Doctor Futch.



BEN L. BRYANT, M.D. (2007 Wilshire Boulevard, Los Angeles).—Doctor Futch has presented a clear and interesting consideration of antrum irrigation through the natural orifice, and I have enjoyed the motion pictures particularly. They are excellent, technically, and must be enlightening to anyone who has felt that the ostium irrigation of the antrum is an unusually difficult procedure. As a matter of fact, those of us who are accustomed to using this procedure frequently feel that, with sufficient knowledge of the anatomy of the part and a certain amount of training and experience, it is certainly no more awesome to the physician than puncture through the inferior meatus and decidedly less so for the patient.

The first several hundred antra which I irrigated were done by means of a trocar introduced through the inferior meatus. I soon changed, however, to the middle meatal approach which I have used exclusively for the past seven years. In a series of several thousand antrum irrigations, it has been necessary to resort to the use of the trocar on only two occasions. I realize that this may seem to be a startling statement, particularly since I have heard a number of erudite discussions at medical meetings as to whether the natural orifice can be entered in 47 per cent, or 53 per cent, or 61 per cent of patients. Of course, I do not feel that my cannula has entered the natural ostium in every instance. In many cases, the accessory ostium was utilized and, in some, the neighboring membrane was punctured. Sufficiently exhaustive and painstaking anatomical studies have been made of the region in question to show that there is a wide variation in the size, form and relative location of both natural and accessory ostia, and a knowledge of the usual and of the unusual locations of these openings is naturally a prerequisite for the use of this method. A further requisite is a careful and complete anesthesia of the part.

My technique has been to shrink the membranes of the middle meatus and the adjacent area first with a pledget impregnated with 2 per cent cocaine solution, following this with 20 per cent cocaine locally on a small cotton-wrapped applicator, the cocaine in both instances being replaced by pontacain in patients who are known to possess a sensitivity to the former. When this has been done to the point where the patient is entirely free of sensation in this region, a small Ritter frontal sound is used as a probe to locate the ostium, or accessory ostium if it is more accessible. If, as is sometimes true, neither can be located without displacing the middle turbinate, a surprisingly slight pressure on the

Ritter sound will carry it through the membrane. After the opening has been located, the blunt cannula of the Killian type can be introduced. In certain cases, due to the topography of the surrounding area, a Spilberg blunt cannula can be used more easily.

Regardless of whether the cannula passes through one of the ostia, as it does in the majority of the cases, or through the middle meatal membrane, as it does in a small percentage of cases, the advantage of this method over the inferior meatal puncture with the consequent trauma, hemorrhage, and opening of new lymphatic and vascular pathways is obvious. One still hears the idea propounded occasionally that the inferior meatal irrigation is better because it affords drainage in the dependent portion of the antrum. This idea is nebulous at best, for the opening made by the trocar closes almost immediately, and even if it did remain open, the experimental work done by Hilding and others has shown conclusively that the ciliary activity of the antrum membrane continues to carry the secretions to the natural ostium in the middle meatus regardless of what has been done in the inferior meatus.

In addition to this, there is the matter of comfort to the patient. That there is a great difference in this respect I can bear witness personally, having had my own antrum irrigated in the past by both methods. I find that it is most unusual to have a patient dread an antrum lavage after the middle meatal approach has been used, even though he feared it greatly on the basis of former experiences with the inferior meatal approach.

Emphasis should be placed on the importance of avoiding any form of antrum irrigation in the presence of acute inflammation. If this rule is observed, and acutely inflamed membranes or an elevation in temperature are considered steadfastly as contraindications for antrum lavage, there will be no need to fear a general constitutional reaction. If this is not observed, high fever, chills, and severe consequences may result.

PRIMARY TUMORS OF THE URETER*

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DISCUSSION by A. J. Scholl, M. D., Los Angeles; Charles Pierre Mathé, M. D., San Francisco; Paul A. Ferrier, M. D., Pasadena.

PPRIMARY tumors of the ureter are seldom encountered. Snyder and Wood, reviewing the literature in 1933, placed the number of proved cases at seventy. O'Brien, this year, added a case, bringing the total to seventy-one. The case I have to report not only makes the total seventy-two, but furnishes a classical description of this unusual pathological lesion.

REPORT OF CASE

Mr. H. E., Case No. 164136, age fifty-four, married, white, and a meat cutter by occupation, was first seen April 18, 1935, complaining that he had noticed mass growing in the left side of the abdomen for the past one and one-half years. During the week previous to our examination, he had become nauseated and had suffered with general aching, for which he consulted a chiropractor who had given him a spinal adjustment, which was followed by a severe pain in the lower part of the back and abdomen. Upon further questioning, the patient stated that he had not been inconvenienced by the growth or pain to the extent that he could not carry on his work as a meat cutter. However, he did mention that he was progressively having more difficulty with his bowels in that he was constipated and suffered considerably with flatulence; yet he denied ever having noticed bloody urine and said he was not having any bladder disturbance to speak of, except a little more

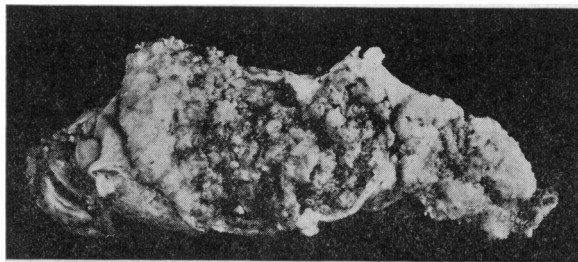


Fig. 1.—Primary tumor of left ureter.

frequency night and day than usual. He thought that his symptoms, as just mentioned, had become more noticeable as the tumor grew larger.

Examination.—On April 24, 1935, at the time the cystoscopic examination and kidney study was first done, the abdomen was filled with a very large tumor mass which was smooth, firm and tender, and which, upon palpation, felt to be full of fluid. The size of the abdomen resembled that of a person suffering with a far-advanced ascites in that the skin was glistening and the abdomen extremely distended. The external genitalia and prostate were normal.

A No. 24 French cystoscope passed readily into the bladder, which was normal yet difficult to distend because of the pressure of the mass above. The ureteral orifice was readily visualized and appeared to be normal. Clear jets of urine were seen spurting from the right orifice, while from the left ureteral orifice several small papillary growths were seen protruding. Indigocarmine was given intravenously before attempting to catheterize the ureters; it appeared from the right side in three and one-half minutes in exceptionally concentrated jets, which were vigorous and forceful, while on the left side no dye appeared at the end of thirty minutes. A No. 6 French ureteral catheter passed to the kidney pelvis on the right side, the urine dripped through the catheter spontaneously and clear, while on the left side the catheter was obstructed at 10 centimeters and with each attempt to pass the catheter further a gush of fresh blood poured out of the ureteral orifice alongside the ureteral catheter.

Bilateral ureteropyelograms were taken. Those of the right side represented a normal ureter and kidney, while those on the left disclosed a filling defect in the lower end of the ureter. (See Figure 3, which was not unlike the filling defect produced in a ureter by a tumor.) Unsuccessful attempts to obtain biopsies of the protruding papillary tumors were made. From the above findings of a tumor in the abdomen and a filling defect in the left ureter, a diagnosis of a large hydronephrosis was made. It was thought at this time that probably the kidney was full of papillary tumors.

Operation.—At operation, on April 26, 1935, the large hydronephrosis was drained through the left costovertebral angle. At the same time the abdomen was explored and 3,500 cubic centimeters of fluid was removed, and a biopsy of the wall of the hydronephrosis proved not to be malignant.

The patient left the hospital in two weeks, and ignored further advice and treatment until, one year later, the drainage had ceased and the hydronephrosis had refilled approximately to its former size.

Course.—A second cystoscopic examination on April 26, 1936, a year later, disclosed the filling defect to be present, and also a papillary tumor growth situated on the tip of the left ureteral orifice, a biopsy of which proved to be a papillary tumor with no essential malignant features. A few days after the second cystoscopic examination the hydronephrotic sac was removed with great difficulty. The ureter was sectioned at junction of the middle and upper third. At this point no tumor was encountered in the ureter.

Pathological Report.—The pathological report of the hydronephrotic sac was as follows: "Specimen consists of a hydronephrotic sac or mass of tissue which weighs 545 grams. Microscopically, areas of old hemorrhage and hemosiderin and cholesterol crystals with foreign body

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